Binational Toxics Strategy

Mercury Workgroup

Chicago December 2, 2002

Dental Mercury: Reducing the Environmental Impact

Purpose of Meeting

"*Defining the Issues*"

- Determine best methods to decrease environmental impact of dental mercury
- Dental Sector in USA is seen as *less active* relative to other sectors
- More robust regulatory activity taking place in Canada
- Several locations in USA have recently implemented regulations

Why is US Dental Sector Under Performing*?*

- Political Pressure
- US regulates at local level – Canada has a nation wide standard in addition to local and provincial initiatives
- Attainability issues
- POTWs have become ***de facto*** regulatory agencies

Bioavailability of Hg in Dental-Unit Wastewater

- A percentage of the Hg in dental wastewater is in forms that can be incorporated into aquatic organisms
- MMHg and ionic Hg have been measured in environmentally significant concentrations

Mean Mercury Determinations by Location and Species

Sample Location	Total Hg	Ionic Hg	Methyl Hg
Chair Side	**6122**	**472**	**0.99**
107-Chair Clinic	**8521**	**1955**	**4.60**
30-Chair Clinic	**6544**	**4602**	**16.67**

units in μg/liter *(ppb, parts per billion)*

n = 5 *(three locations sampled over 5 days)*

Systems to Remove Mercury in Dental-Unit Wastewater

- Hg removal equipment for dental offices are widely available on the market
- Range from particulate removal systems to systems with ***oxidation*** and ***affinity resins*** (sorbents) that remove ionic Hg
- Removal of Hg from dental-unit wastewater to sub ppb levels is possible with commercial systems

ADA Study on Separators

- Recently published report in ***JADA Volume 133, May 2002***
- Evaluated 12 amalgam separators
- Utilized the ISO 11143 standard
- All the units passed and removed at least 96.03% of amalgam sample
- Hg levels in effluent varied widely

Do Separators reduce Hg loading to POTWs?

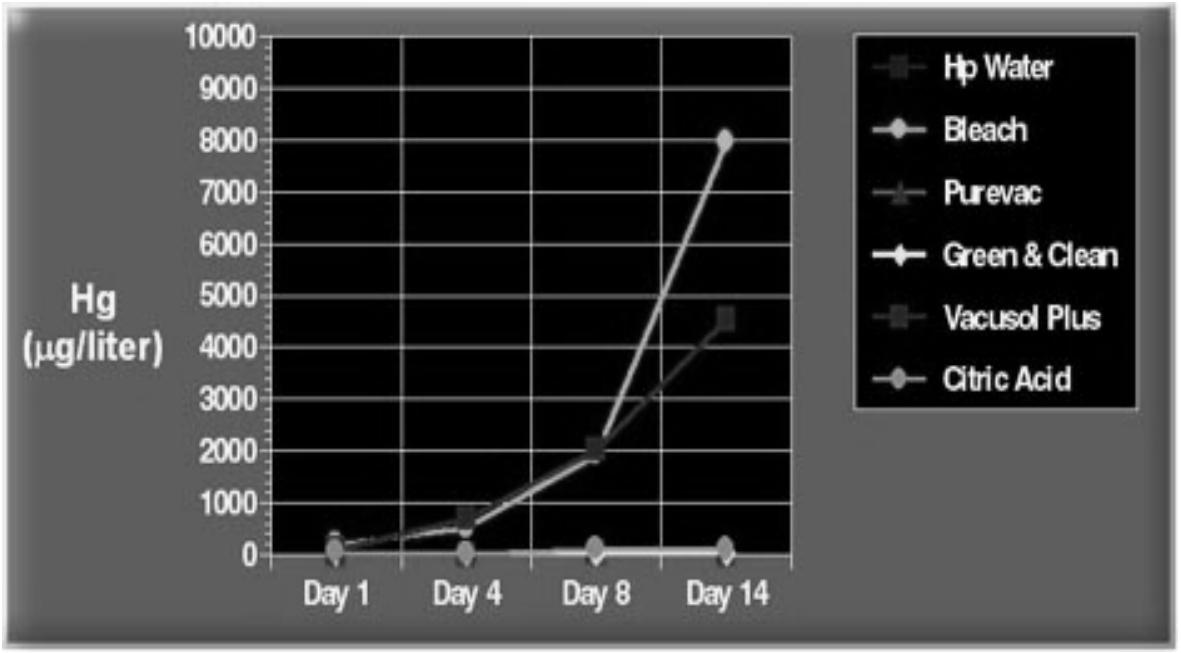
- Toronto data – 40 to 60% decrease Hg in sludge since separators installed
- MCES data from Minnesota – 29 to 40% Hg reduction in sludge levels with amalgam separators
- WLSSD Data from Tim Tuominen
- Naval Base Great Lakes/NSSD data

Residual Hg in Sewer Lines

- Residual Hg in wastewater lines can be substantial
- Plumbing acts as a separator
- TCLP studies on wastewater lines show pipes can exceed RCRA limits for Hg
- Hg can be mobilized from amalgam in waste lines

Action of Line Cleaners

- Some oxidizing line cleaners used to clean suction lines can mobilize Hg from amalgam
- Bleach ***(Sodium Hypochlorite, NaOCl)*** is one of the worst offenders



Case Studies

King County
Washington State

- Working on dental mercury release since 1990 *(Gail Savina)*
- Voluntary program not successful – *only 25 clinics installed separators, 2.8%*
- Required to meet local discharge limit of 200 ìg/liter (5 year permit just renewed)
- Follow Best Management Practices for amalgam waste

King County
Washington State

- Install approved separator *or* apply for permit and demonstrate *not* to be in violation of discharge limit
- Permit fees range from no cost to $1200 for 5-year period
- King County separator approval process being phased out in favor of the ISO standard (ISO 11143)
- Some specialists are exempt: *OS, OM, OR, OP, Ortho, Perio, and other specialists that don't place or remove amalgam fillings*

King County
Washington State

- 800 to 900 general dental clinics in King County
- July 1st 2002 – New office construction must have approved separator
- July 1st 2003 – All dental clinics must have installed separator or permit

King County
Point of Contact

Patricia Magnuson

Investigator, King County Industrial Waste Program

130 Nickerson Street, Suite 200

Seattle, WA 98109

(206) 263-3021

http://dnr.metrokc.gov/wlr/indwaste

Duluth Minnesota

Western Lake Superior Sanitary District

- Active in dental Hg issues over ***10 years***
- Work in partnership with the local dental society
  - 50 general practices with 100 dentists
  - Educational training (BMPs)
  - State and local levels
  - On-site training
  - Small business waste collection program
  - Program 100% voluntary

Duluth Minnesota

Western Lake Superior Sanitary District

- Investigating the effect of separators on Hg influent to their WWTP
- Influent levels to WWTP at **90 ppt**
- Effluent levels from WWTP between **1.2 to 2.7 ppt**
- Sludge levels are between **0.19 and 0.68 ppm (dry)**
- Trend is continuing downward

Duluth Minnesota

Western Lake Superior Sanitary District

Point of Contact

Tim Tuominen

(218) 722-3336 extension 324

tim.tuominen@wlssd.duluth.mn.us

http://www.wlssd.duluth.mn.us

Wichita Kansas

- Metropolitan area of 500,000 in SE Kansas
- 200 dental clinics in metro area, 150 of which are general practice
- ***Phase 1*** -- installation of technology greater than already in office is mandated by October 2001
- If a 50% reduction to WWTP is not obtained by June 2003 then Phase 2 will be implemented
- ***Phase 2*** -- installation of ISO 11143 certified separators mandated

Wichita Kansas

- City maintains a list of approved separators
- Each clinic samples wastewater annually
- City inspects and samples clinics on an annual basis
- Each clinic submits annual self monitoring report
- WWTP sludge is land applied

Wichita Kansas

- KSU Pollution Prevention Institute ***Nancy Larson is POC***
- Mercury educational effort
- Amalgam waste fact sheet
- Curriculum presented to dental schools, hygiene and dental assistant programs

Wichita
Points of Contact

Nancy Larson

(800) 578-8898

Jamie Belden

(316) 303-8775

Rebecca “Becky” Gagnon

(316) 303-9900

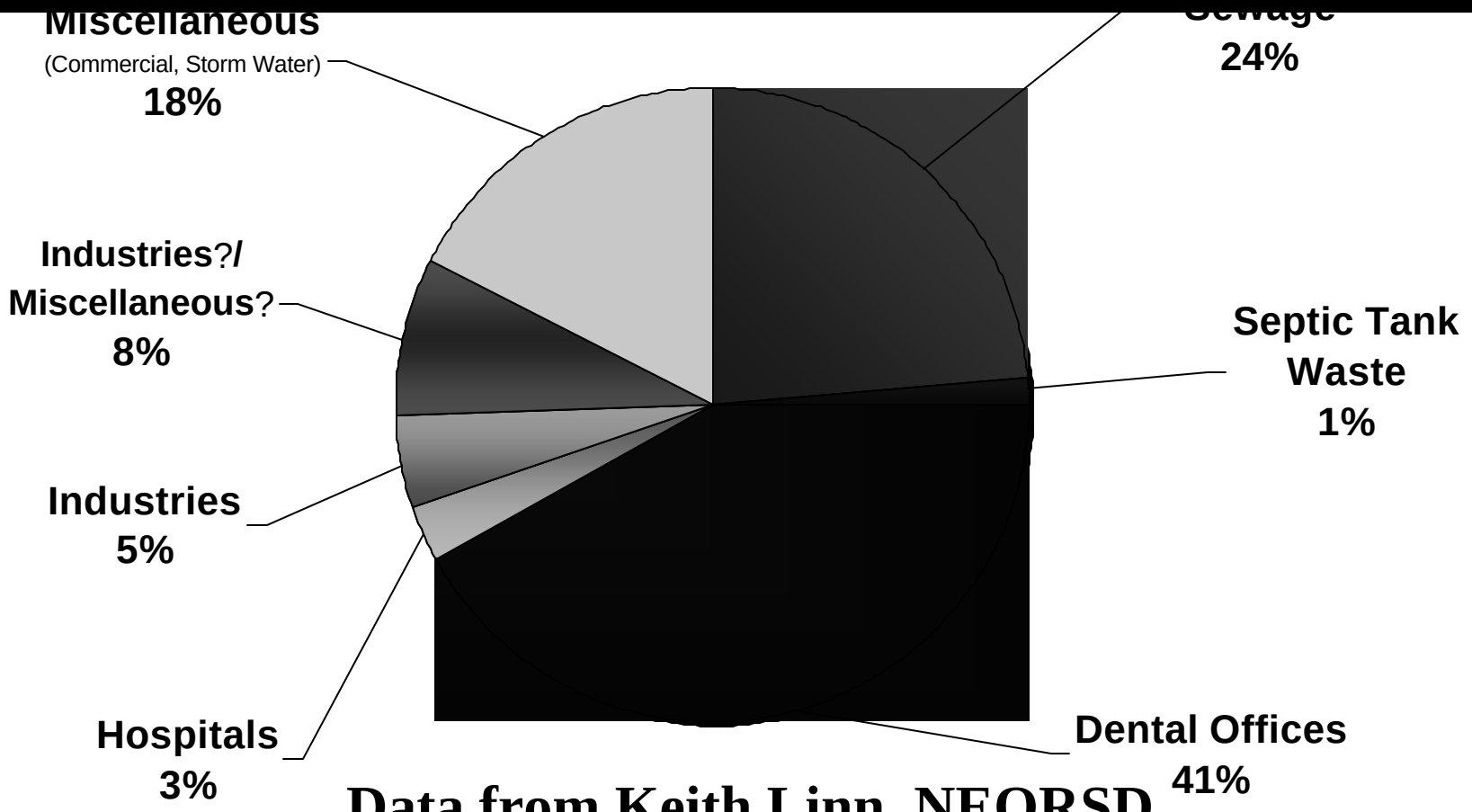
Cleveland Ohio
(NEORSD)

- NEORSD will be held to discharge limit of 1 ppt (ng/liter) within a year
- New discharge limit driven by GLWQI *(1.3 ppt ambient Hg levels)*
- 300 MG/D discharged into Lake Erie and Cuyahoga River
- Implementing narrative limit for Hg including BMPs

Cleveland Ohio (NEORSD)

- NEORSD estimates 2/3 of its volume is from residential sources with Hg levels ranging from 50-100 ppt
- May require separators for dental clinics
- Attainability issues: *may not be able to achieve discharge limit even by disconnecting all dental clinics*

NEORSD Mercury Source Estimates August 2002



Data from Keith Linn, NEORSD

NEORSD
Point of Contact

Keith Linn

4747 East 49th Street
Cuyahoga Heights, OH 44125
LINNK@neorsd.org
216-641-6000, ext. 2202

Los Angles, California

- City of Los Angeles *(and 6 other cities who contract with LA for wastewater treatment)* has formal regulatory program for dental offices that will go into effect late this year
- Will require dental offices to comply with specific BMPs but it does ***not*** require amalgam separators

Richmond, California

San Francisco Bay Area

- 9 dentists in its service area
- 5 ppb discharge limit
- Dentists have worked cooperatively with city for past 2-3 years. All dentists have been cited at least once (fines waived)
- City tried numerous methods to reduce Hg discharge -- best results where dentist implemented BMPs *and* installed separator ***(However, local discharge limit still exceeded)***

California Point of Contact

Teresa Pichay

California Dental Association

(209) 257-1935

TeresaP@cda.org

New Hampshire

- Passed legislation requiring its environmental agency to come up with regulations for all dental offices
- Expect to be done in the coming year

Massachusetts

- Massachusetts Executive Office of Environmental Affairs is doing a study of ISO test and available separators
- Currently no regulatory plan in effect
- Point of Contact:

Charles Bering

(617) 788-2309

Charles.Bering@mwra.state.ma.us

U.S. Navy Initiatives

- US Navy is in process of installing separators in all dental facilities
- Program Managed by **NDRI**
- Installed systems remove particulate and “dissolved Hg”
- Install in all US and overseas dental treatment facilities
- Funding comes from DoD Health Affairs

Mercury in Sink “P” Traps

- Repair Technicians found 13 lbs of amalgam scrap in DTR “P” traps
- Result of rinsing chair side traps into sink at end of day and from patients rinsing after treatment

Mercury in DTR “P” Traps

“P” Trap


WEEELLLLL, I AM THE TUNA!!!
AND YOU KNOW I'M DOLPHIN-FREE!!
BUT B-B-BABY I'M LOADED...
WITH METHYL-MERCURY!!!
HEAVY METAL IN THE MARINE ENVIRONMENT